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ABSTRACT

Sex restrictiveness and sex bias in occupational interest scales are reviewed, and some alternative solutions are briefly discussed. Traditionally, it was thought that sex restrictive interest inventories merely reflected the inherent differences between males and females. The author defines sex restrictiveness according to the degree that the distribution of career options suggested to males and females is disproportionate. Conversely, an inventory is not sex restrictive if each career option is suggested to similar proportions of males and females. The sex restrictive test is not necessarily biased, however, since it may have to be restrictive in order to be valid. Different definitions of validity may affect this judgment. A sex restrictive test may still be defined as sex fair if its publisher has demonstrated that its restrictiveness is necessary for its validity. A brief review of various studies about the interest of college bound and college students indicates that vocational interest inventories do not have to be sex restrictive in order to be valid. Study of the unisex edition of the American College Test interest scale (UNIACT) indicates that sex balanced reporting procedures, suggesting similar interest patterns for males and females, have promising validity. Further research is recommended. (Author/GDC)

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BASIC VOCATIONAL INTEREST SCALES: THE PROBLEM OF SEX RESTRICTIVENESS AND ALTERNATIVES[1]

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Basic vocational interest scales are used in a wide variety of interest inventories. Perhaps the classic example is the Kuder Preference Record (Vocational). But even the "Strong," which is traditionally identified with occupational scales, reports scores for 23 "Basic Interest Scales" and 6 "General Occupational Themes." Typically, basic interest scales are used to enhance self-knowledge and to suggest career (educational and vocational) options compatible with a person's pattern of interests. Sometimes they may reinforce a current choice. The same basic interest scales can serve all three purposes.

This paper discusses problems of sex restrictiveness in basic interest scales and suggests potential alternatives. The title could just as well read "Some New Data Relevant to Old Issues." I hope that readers who have followed the literature on sex bias in interest assessment will excuse the "boiler plate" that appears at several points in the paper. The old problems and issues are still with us; and since the "old data" aren't really that old, or widely known, a brief review of published research is provided in conjunction with the results of some recent studies.

Overview of Problems and Alternatives

Current problems of sex restrictiveness in vocational interest assessment appear to rest on the belief that sex-restrictive interest inventories simply report facts of life. They are Mother Nature's way of reminding vocational counselors that boys and girls are different. However, many counselors may not be aware of what the term "sex restrictive" really means or the degree to which sex restrictiveness exists in widely used interest inventories.

One way to define sex restrictiveness is through some actual data. According to Gottfredson, Holland, and Gottfredson (1975), for example, the distributions of Self-Directed Search (SDS) high-point codes (highest scores) for "diverse samples of 2,169 high school boys [and] 2,447 high school girls" (p. 139) are as follows:

SDS scale	Girls	Boys	Occupational categories associated with SDS scale
S	67%	20%	Education and social welfare occupations
A	13	8	Artistic, musical, and literary occupations
C	11	3	Office and clerical occupations
R	1	40	Skilled trades, technical, and some service occupations
I	8	23	Scientific and some technical occupations
E	1	6	Managerial and sales occupations

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As can be seen, over 90% of the high school girls receive their highest SDS raw scores for S, A, or C (social, artistic, office, clerical, etc.) occupations. Only about 10% score highest on I, R, or E (scientific, trades/technical, managerial, etc.) occupations. In contrast, 70% of the boys receive their highest scores for these latter occupations.

The above distributions of scores for males and females and the associated career options help define the practical aspects and implications of sex restrictiveness. The more formal definition adopted in this paper reads as follows: "An interest inventory is sex restrictive to the degree that the distribution of career options suggested to males and females is disproportionate. Conversely, an interest inventory is not sex restrictive if each career option covered by the inventory is suggested to similar proportions of males and females" (Prediger & Hanson, 1974, p. 97).

I hasten to emphasize that a sex-restrictive inventory is not necessarily sex biased. The distinction between sex restrictiveness and sex bias is crucial for, as Holland and others have pointed out (e.g., see Gottfredson, et al., 1975; Holland, 1975), interest inventories may have to be sex restrictive in order to be valid. This reasoning is the basis for the following definition of sex fairness: "In order for a sex-restrictive inventory to be called sex fair, the publisher must demonstrate that sex restrictiveness is a necessary concomitant of validity as commonly defined" (Prediger & Hanson, 1974, p. 101). Stated another way, if sex restrictiveness cannot be justified on the basis of validity evidence, then it is synonymous with sex bias. Thus, the definition follows principles underlying Equal Employment Opportunity Commission Guidelines (1970). The burden of proof, however, is on the test publisher, not the test user.

Because alternatives would be of little use if sex restrictiveness is a necessary concomitant of validity, research bearing on this issue is the major focus of this paper. However, to further illustrate the extent of the problem posed by sex restrictiveness, it will be useful to look at the degree to which sex restrictiveness is present in various interest inventories.

Incidence of Sex-restrictiveness

Although the male-female distributions shown above are seldom available for interest inventories, one can frequently find scale means and standard deviations for males and females. Given these data and the procedure developed by Tilton (1937), it is a simple matter to determine the degree to which the scores of males and females overlap. Table 1 provides illustrative data for scales assessing common dimensions of interests (i.e., Holland types).

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Insert Table 1 about here.

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Dunnette (1966) has suggested that two distributions differ in meaningful ways if overlap is less than 75 percent. Whether or not this criterion is applied, it is readily evident from Table 1 that male-female score differences on certain scales are substantial. However, such differences are not limited to scales

assessing Holland types. For example, male-female score overlap ranges from 46% to 99% (median of 80%) for the 23 SCII Basic Interest Scales, according to data for the General Reference Sample (Campbell, 1977, p. 38). Male-female overlap for 5 scales falls below 75%. Readers are reminded that these data are not necessarily indicative of sex bias.

It is clear from Table 1 and the previous SDS distributions that substantial discrepancies in the scores of males and females are common to traditional interest inventories. Raw scores, of course, reflect any differences in the responses of males and females to specific items. Since combined-sex norms merely anchor raw score scales to parameters based on the total group of males and females, any sex differences on a raw score scale will be reflected in a scale based on combined-sex norms. Thus, as shown by Cole and Hanson (1975), standard scores based on combined-sex norms produce sex differences similar to those observed for raw scores.

When score reports are based on same-sex norms, however, males and females receive highly similar (sex-balanced) interest profiles and distributions of career suggestions (Cole and Hanson, 1975; Gottfredson, et al., 1975; Prediger and Hanson, 1974). This occurs because of the very nature of the norming procedure--regardless of sex differences in raw score distributions. The Kuder (Vocational) is a classic example of an inventory using same-sex norms.

Overview of Alternatives

One alternative to sex-restrictive interest reports, then, involves the use of same-sex norms. Another alternative involves the elimination of sex differences at the item level, as suggested by Harmon (1975). Although it is not well known, interest inventory authors have written substantial numbers of sex-balanced items in the past. Responses to about half of the items in current inventories are approximately sex-balanced (Campbell, 1977; Harmon, 1975; Johansson, 1976). The implication is that it may be possible to develop interest inventory scales consisting entirely of sex-balanced items. In that case, both raw scores and standard scores based on combined-sex norms would be sex balanced.

As noted previously, the crucial question with respect to both of the above alternatives to sex-restrictive reports (i.e., use of same-sex norms or sex-balanced items) is whether interest scores must be sex restrictive in order to be valid; or conversely, whether sex-balanced reports have less validity. This question needs to be addressed in order to evaluate alternatives to current practice. First, however, careful attention must be given to the procedures used to determine "validity."

Validation Models

Because I believe it is crucial to distinguish among various validation models if we are to make progress in eliminating sex bias from interest assessment, and because I don't know how to explain it any better, the passages that follow were taken more or less intact from a recent article (Prediger, 1977) in Applied Psychological Measurement.

As Kuder (1970) noted, "the problem of establishing validity for counseling purposes becomes one of classification [hence] one of the fundamental questions in judging a vocational interest inventory is how well it differentiates among the specific occupational groups for which it is scored" (p. 209). Strong (1943), although primarily concerned with the differentiation of occupational groups from men or women in general, also recognized the need to differentiate among the occupational groups themselves. Though other, perhaps better, approaches to validation are possible (e.g., determination of correlations with satisfaction or success), interest inventory construction and validation studies have typically focused on criterion group differentiation/classification. . . .

It is well known that the validity of a measuring instrument depends on the purposes for which it is used. Hence, before studying validity, one must ask, "Validity for what?" Interest inventories are commonly used to suggest possible occupational options to counselees. Yet, the validity of inventories is often reported in terms of their ability to predict future occupational preferences or occupational entry [e.g., see Gottfredson and Holland, 1975b]. As Berdie (1970) has noted, few counselors are interested in predicting whether a counselee will enter (or prefer) occupation A or occupation B. Hence, validity data for this use of interest inventories may provide a distorted view of validity for more common uses. Some of the reasons are discussed below.

The "Will-Prefer-or-Enter" Criterion

When predicting the occupations persons will prefer or enter, the nature of employment distributions as well as the nature of occupational preferences must be taken into account. Stated another way, if an interest inventory is to provide accurate predictions of eventual employment, the predictions must accurately reflect the size of each occupational criterion group. To the degree that group membership predictions depart from group base rates, the inventory's predictive accuracy will be lowered.

Interest inventories predicting that persons will enter or prefer occupations in the same proportions as in the past should do well under this approach to validation. For a multitude of reasons (e.g., social expectations, local labor market needs, the contingencies of life), people will continue to state preferences for and enter traditional occupations. Unfortunately, the number of persons in various occupations and occupational preference groups differs widely from group to group (Gottfredson, Holland, & Gottfredson, 1975; Prediger, Roth, & Noeth, 1974). Since the predictions used in validation studies are based on the same scores counselees receive, the occupational options suggested to counselees will reflect the same differences in base rates as the predictions. Under this approach to validation, a "valid" interest inventory in the 1850s would have suggested farming to nearly everyone. The employment status quo will be reflected and reinforced by interest inventories validated in this way.

The "Should-Consider" Criterion

The alternative approach to the use of occupational preference and membership as criteria in validating interest inventories assumes that the purpose of interest inventories is to identify career options for counselees to consider rather than to predict the occupations counselees will prefer or enter. To achieve the former objective, an interest inventory must assess the correspondence between a counselee's interests and the interests associated with various occupational groups--regardless of the group base rates. If a counselee's interests are similar to the interests of persons in a given occupation, one would suggest that the counselee consider the occupation, even though relatively few persons are employed in the occupation. The emphasis is on "should consider," not "will enter or prefer." The underlying assumption is that employment data may play an important role in career counseling, but they should not influence interest score reports.

Studies following this approach to interest inventory validation will treat occupational criterion groups (or preference groups) as if they were of equal size. One would expect an interest inventory to suggest engineering to a large proportion of criterion group members in engineering, nursing to a large proportion of nurses, retail sales to retail sales clerks, horseshoeing to horseshoers, and so on for each of the criterion groups available. The fact that there are relatively few horseshoers in comparison to retail sales clerks is irrelevant. The question asked in this validation analysis is "What proportion of the members of each criterion group would have been asked to look into their occupation by this interest inventory?" Stated differently, the question is "What is the hit rate for each criterion group?" A high hit rate depends on an inventory's ability to differentiate the criterion groups and, thus, minimize the misassignment of members of each of the groups.

In this approach to validation, an interest inventory does not have to suggest retail sales to more counselees than horseshoeing because there are more retail sales clerks than horseshoers. "Predictions" are simply based on whichever criterion group a person resembles most. There is no premium placed on providing interest-score distributions that parallel preference or employment distributions. This proposed validation strategy recognizes that, for a number of very practical reasons, many persons may not enter the occupations suggested ("predicted") by an interest inventory.

How Choice of Criterion Affects Career Guidance

Perhaps the following example will bring differences between the two approaches to validation into sharper focus. Suppose that in a society built on the caste system, an interest inventory was designed to have high validity in predicting occupational entry. The inventory would suggest few, if any, occupations that were not traditional for a person's caste. To do otherwise would lower its validity. On the other hand, suppose the inventory was designed to identify occupational options compatible with a person's interests--regardless of the proscriptions of the society. Such

> an inventory may suggest many occupations not traditional for members of the caste. As a result, it would be a poor predictor of occupational entry. Yet, it may do an excellent job of determining occupational compatibility. Even in a time of social change, the score reports might be unsettling, but they could provide beneficial information, both to the individual and to the society (pp. 275-277).

Although useful in some types of research, interest inventories designed to predict which persons will prefer or enter a given occupation present special problems for vocational counseling. In effect, the rationale underlying such inventories says "Cindy may have interests like an engineer and Mike may have interests like a nurse. But few females or males are likely to enter those nontraditional occupations. So let the predictions (score profiles) take into account the relative numbers of males and females who have entered various occupations in the past. In the long run, a higher hit rate will be obtained and the inventory will appear to be more valid." When used in vocational counseling, inventories based on this rationale will reinforce society's occupational sex-role stereotypes and thus further institutionalize the channeling. At first glance, such inventories may appear to have higher validity than inventories designed to report occupational options compatible with a person's interests. But this may be true only if one's purpose in assessing interests is to predict the occupations counselees will enter (or prefer). I can't help wondering how many readers use interest inventories for this purpose.

Prediger and Cole (1975) provide an extended discussion of this topic as it applies to career counseling and nontraditional occupations for males and females. Prediger (1977) discusses specific implications for validation procedures.

Validity of Sex-restrictive and Sex-balanced Reporting Procedures: A Comparison

Now, I would like to return to the key question posed earlier--"Must vocational interest reports be sex restrictive in order to be valid?" Table 2 summarizes the results of 10 studies comparing the criterion-related and construct validity of sex-restrictive and sex-balanced reporting procedures. In each of the studies, sex-balanced reporting procedures were based on same-sex norms. The results cited for sex-restrictive reporting procedures were obtained with raw scores. (As previously noted, combined-sex norms reflect essentially the same male-female differences as raw scores.) All studies used measures of Holland types and for a given study, both sex-restrictive and sex-balanced reports were obtained from the same interest inventory. Thus, any differences in validity reflect differences in the presence or absence of sex restrictiveness in the reporting procedures.

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Insert Table 2 about here.

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Six of the studies have appeared in the professional literature and are abstracted in the attached paper entitled "The ACT Vocational Interest Research Program: Summary of Reports (7/78)." Abstract numbers appear in the left hand column of Table 2. The other four studies, which were completed during the past year, are described below.

Study 1: Procedures

Study 1 involved 11,395 college seniors (5,846 males and 5,549 females) enrolled in 16 major universities located primarily in the midwestern, southern, and southwestern regions of the country. Fifteen states were represented. A high percentage of the 1974-75 incoming freshmen at each of the institutions had completed the ACT Assessment Program (AAP) battery as college-bound students in 1973-74, the first year ACT Interest Inventory (ACT-IV) was included in the AAP. A roster of 1977-78 seniors was obtained from each of the institutions and matched against a roster containing the ACT-IV scores of 1974-75 enrollees. Since the college majors of the seniors were known, it was possible to determine how seniors majoring in various areas scored on the ACT-IV four years earlier.

Because all students had achieved senior status in college less than four years after entry, very little time could have been lost due to dissatisfaction with major or unsatisfactory academic performance. Thus, the study design included an indirect criterion group screen for success and satisfaction. The percentage of ACT-tested enrollees at each of the institutions ranged from 64% to 100% (median of 88%). Hence, a high proportion of all seniors meeting the 4-year screen had taken the ACT-IV.

College majors were allocated to Holland types on the basis of the classification system and associated alphabetical index provided by Holland (1972). Interest profiles were allocated to Holland types on the basis of the student's highest score (high-point code) for each of the two types of reporting procedure. All score ties were broken randomly. Thus, each college senior in the sample was allocated to a Holland type by two methods: (a) on the basis of academic major, and (b) on the basis of ACT-IV scores. The former method established the student's criterion group membership. Correspondence between a student's criterion group and high-point code was then determined separately for the sex-restrictive and sex-balanced reporting procedures. "Hit rates" were tallied separately for males and females in each criterion group.

Study 2: Procedures

Study 2 involved a subset 2,096 college seniors in Study 1 plus an additional sample of 903 seniors who had not taken the ACT-IV four years earlier. (Prior ACT-IV data were not needed in Study 2 because the design was cross-sectional rather than longitudinal.) Altogether, there were 2,999 students in the study. The sampling plan involved the random selection of approximately equal numbers of males and females majoring in each of ten fields (e.g., engineering, art, physical sciences). The fields were selected to span Holland's six types. The additional sample of students not in Study 1 was needed to assure sufficient numbers in each type to support separate hit rate analyses for males and females.

The 2,999 students in Study 2 were randomly allocated to two subsamples. The first was asked by mail to complete the ACT-IV and UNIACT, with items sequenced in that order. The second sample was asked to complete UNIACT and the ACT-IV. Thus the administration design was counterbalanced. Both local and home addresses were obtained from the universities. Home addresses were used when local addresses proved to be invalid.

After two follow-up mailings, the last about ten weeks after the initial mailing, usable replies were received from 1,988 of the 2,905 students for whom there was no evidence of bad addresses (68% response rate). The response rate for the total sample was 66%. All students received a 4-page report of vocational interests, including reference material, in return for their participation in the study.

A number of students in various engineering and agricultural specialities who had been assigned to Holland's realistic type when the sample was initially selected were subsequently shifted to the investigative type upon final assignment. These and a few other changes, including the elimination of 26 cases with very general majors, were made to achieve close correspondence with Holland's classification system. As in Study 1, students were also assigned to Holland types on the basis of high-point interest codes. Correspondence between college major type (i.e., criterion group) and interest type was then determined for the sex-restrictive and sex-balanced scores.

Study 3: Procedure

Study 3 involved 2,013 of the approximately 127,000 college-bound students who registered for the October 1977 AAP national test date. Only those students who were high school seniors planning to enroll in college the following fall and who were "fairly sure" or "very sure" of their first occupational choice were eligible for the study. The Study 3 sample was selected from this pool on the basis of the general correspondence of expressed vocational choice, as recorded on the AAP registration sheet, to the six Holland types. The sampling plan involved the random selection of approximately equal numbers of males and females of each Holland type (i.e., criterion group) with some oversampling in the artistic and realistic categories.

As in Study 2, students in Study 3 were asked by mail to complete the ACT-IV and UNIACT. A counterbalanced design was used. After two follow-up mailings, the last about three weeks after the initial mailing, usable replies were received from 1,589 of the initial sample of 2,013, a 79% response rate. All students received a 1-page computer-printed report of vocational interests supplemented by reference materials.

As in Study 2 there were some changes made in the initial criterion group allocations in order to achieve close correspondence with Holland's classification system. Criterion group hit rates were determined using procedures described for Studies 1 and 2.

Studies 1, 2, and 3: Summary of Results

The unweighted average hit rates shown in Table 3 provide a general index of

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Insert Table 3 about here

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the criterion-related validity of the sex-restrictive and sex-balanced reporting procedures used in Studies 1, 2 and 3. This hit rate index treats the criterion groups as being of equal importance in vocational counseling and is appropriate to use of the "should consider" validation model (Prediger, 1977) described earlier in this paper.

In all three studies, overall hit rates for the sex-balanced and sex-restrictive score reports were similar, with small differences generally favoring sex-balanced reports. Overall hit rates for males and females differed somewhat; however, the male and female criterion groups were not comparable due to differences in the mix of majors (Studies 1 and 2) and occupational preferences (Study 3). Across the three studies, sex-balanced reports produced higher hit rates than sex-restrictive reports for 13 of the 18 female groups and 9 of the 18 male groups.

Study 4: Procedures and Results

Walsh and his students at Ohio State have conducted a series of four studies in which the SDS was administered to predefined criterion groups (Fishburne & Walsh, 1976; Horton & Walsh, 1976; Matthews & Walsh, 1978; O'Brien & Walsh, 1976). Across the four studies, there were 540 persons in 24 occupational groups, 12 composed of males and 12 composed of females. Each study followed the same model. Adults in six occupations representing the six Holland types completed the SDS. For each occupational group, raw score means were calculated for each of the six SDS scales.

Walsh and his students focus on a comparison of the raw scores obtained by all six occupational groups on a given SDS scale. However, another interesting comparison follows Holland's model for developing high-point codes for occupations (Holland, 1973). In this model, raw score means for all six SDS scales are ranked for a given occupation. According to Holland's theory, the scale with the highest mean should correspond to the Holland type for the occupation. This occurred 11 out of 24 times across the 4 studies.

In order to determine the effectiveness of sex-balanced interest reports using the same criterion of validity, I sought same-sex norms that could be used to convert the SDS raw scores to standard scores. Of the normative data provided by Gottfredson and Holland (1975a) for adults (N=140), college students (N=3,355), and high school students (N=4,675), the high school data appear to be the most comprehensive. Gottfredson and Holland note that the data "usually represented large and diverse samples from many sources, but the high school and college samples are believed to be reasonably representative of groups commonly taking the SDS." (1975a, p. 2).

Raw score means for the SDS were transformed to standard score means using the high school norms for males and females provided by Gottfredson and Holland (1975). For the one study involving college-degreed workers (Horton & Walsh, 1978), the college student norms provided by Gottfredson and Holland (1975) were also used as a cross check. Of the 24 occupational groups, 12 received their highest mean score on the appropriate SDS scale. These results suggest that the criterion-related validities of sex-restrictive and sex-balanced SDS reports are similar. Thus, the results are congruent with results for the other nine studies reported in Table 2.

Must Interest Scores be Sex-Restrictive in Order to be Valid?

The previous section summarizes results for 10 studies comparing the construct and criterion-related validity of sex-restrictive and sex-balanced procedures for reporting interest scores. Included were concurrent and longitudinal studies involving a variety of criterion groups and instruments (e.g., the SDS, VPI, SVIB, and ACT-IV). Results from each of the studies indicate that the validity of interest inventories is not lowered through the use of sex-balanced score reports. In several instances, it is increased. A recent study by Lamb (1975) also indicates that sex-balanced score reports are appropriate for use with males and females in various minority groups, and several studies show that persons in a wide range of criterion groups obtain sensible score profiles when sex-balanced reports are used. Hanson, Prediger, and Schussel (1977) use high-point codes based on same-sex norms to summarize longitudinal and cross-sectional data on the vocational interests of 103 educational criterion groups (N=18,435), 10 occupational criterion groups (N=1,073) and 39 vocational choice groups (N=7,148). The 3-letter codes for males and females are generally congruent with expectations based on Holland's theory of careers.

In six of the ten studies summarized in Table 2, sex-restrictive reports based on combined-sex norms were included in the comparisons. (Results were not summarized to avoid complicating the table.) The validity of these reports was sometimes higher than the validity of the sex-restrictive raw scores summarized in Table 2, but in no case exceeded that of the sex-balanced reports. One other study relevant to this issue (Gottfredson & Holland, 1975), is sometimes cited as showing that sex-balanced reports are "less valid." In that study, sex-restrictive reports did produce more accurate predictions of future vocational preference for college women. As already noted, however, this approach to validation (i.e., prediction of future preference) is not applicable to counseling uses of interest inventories. In any case, the predictions failed to improve upon the base rates or predictions based on current preference--alternative procedures for predicting future preference that ignore interest scores.

Considered as a whole, the validity data summarized in Table 2 indicate that vocational interest inventories do not have to be sex restrictive in order to be valid. Thus, sex-restrictive interest score reports may well be sex biased. Interest inventory publishers and other researchers might consider conducting additional studies comparing the validity of sex-restrictive and sex-balanced reporting procedures.

Validity of Sex-balanced Reporting Procedures and Sex-balanced (Unisex) Scales: A Comparison

The data thus far indicate that sex-balanced interest reports based on same-sex norms provide a viable alternative to sex-restrictive reports. As noted previously, another alternative is to eliminate sex differences at the item level and, thus, produce "unisex scales" (Rayman, 1976) based on sex-balanced items. Since males and females will obtain similar scores on these scales, combined-sex norms could be used without being sex-restrictive. Same-sex norms which, according to some, "treat males and females differently," would no longer be needed.

Studies by Boyd (1976), Gottfredson (1976), and Holland and Gottfredson (1976) show that simply desexing existing items has little effect on scale scores. However, no attempt was made in those studies to write and pretest new items endorsed in equal proportions by males and females. Rayman (1976), working with Hanson and Cole at ACT, recently demonstrated the viability of this latter approach to interest scale construction. Subsequently, Hanson and Rayman (1976) showed that Rayman's "unisex scales" had criteria-related validity equivalent to that of sex-restrictive scales administered to the same sample.

Encouraged by these results and the related work of Lunneborg (1977), staff members at ACT conducted a series of studies leading to the development of the Unisex Edition of the ACT-IV (UNIACT). Starting with a substantial pool of sex-balanced items already used on various forms of the ACT-IV, we attempted to write additional items that captured the essence of a work-related activity preference while minimizing sex-role connotations. As noted by Prediger and Hanson (1978), "this approach to interest scale construction recognizes that sex differences in the responses to many interest items may reflect the differential effects of sex-role socialization on males and females without necessarily reflecting differences in basic interests. Thus, groups of males and females may respond quite differently to interest inventory items with sex-role connotations. . .even though the groups may have similar patterns of interests."

Consider, for example, the following interest items which are typical of those included on some "mechanical" or "realistic" interest scales. "Would you like to be--

--a car mechanic?
--a bulldozer operator?
--a train engineer?
--a power shovel controller?"

Should one take sex differences on a scale containing such items at face value--as indicators of fundamental differences in the mechanical (realistic) interests of males and females? Certainly, the items appear to fit the "mechanical" category; they are gender neutral; and they may correlate with other items in the appropriate manner. (Similar items have.) But do they register the interests of males and females in equal measure? Would the scores of males and females differ by the same amount if items free from sex-role connotations were used? The work of Rayman (1976) clearly suggested that the answer is "no." We proceeded on that basis.

The construction of UNIACT primarily involved the development and repeated try-out of potentially sex-balanced items. As described by Hanson, et al. (1977), more than 200 items were used in a series of studies involving six samples (N=10,388) of 9th graders, 11th graders, college-bound students, college sophomores, and adults. Initial data on the psychometric characteristics of UNIACT were reported by Hanson, et al. (1977) and summarized by Prediger and Hanson (1978). Beginning in the fall of 1977, UNIACT replaced the ACT-IV as a core component of the ACT Assessment Program (the "ACT"). A 60-item version of UNIACT is also used in the Vocational Interest, Experience, and Skill Assessment (ACT, 1976). In both assessment programs, UNIACT score reports are based on combined-sex norms.

Psychometric Characteristics of UNIACT

Internal consistency reliabilities for the six 15-item UNIACT scales range from .85 to .92 with a median of .87 for a holdout sample of 914 males and 937 females (Hanson, et al., 1977). Test-retest reliabilities for about a 6-week interval range from .79 to .87 (median .82) for the students in Study 3. Male-female score overlap is shown in Table 4 for four samples. For the UNIACT norm group, the range is 85% to 99% with a median of 91%. Across the four samples, overlap for the Social Service Scale was generally the lowest, yet it ranged from .84 to .85, well above Dunnette's (1966) 75% criterion cited earlier.

As previously noted, UNIACT and earlier editions of the ACT-IV were constructed to assess Holland types. (ACT-IV profiles generally in accord with Holland's theory of careers are provided by Hanson, et al., 1977, for a wide variety of criterion groups.) As reported by Hanson, et al. (1977), the correlations between parallel UNIACT and ACT-IV scales range from .76 to .86 with a median of .80 for a grade 11 sample. In Study 2, correlations

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for males ranged from .71 to .92 (median of .88). For females the correlations ranged from .75 to .91 (median of .87). Correlations based on Study 3 data for males ranged from .84 to .95 (median of .91). The correlations for females ranged from .80 to .94 (median of .91). As indirect indicators of UNIACT construct validity, these correlations compare quite favorably to the median VPI-SDS correlations of .55 for males and .43 for females reported by Holland (1972), especially since the VPI is a major component of the SDS and both were constructed to assess Holland types (Holland, 1973).

Additional data bearing on the construct validity of UNIACT scales are provided by their factor structure. As shown by the factor loadings in Figure 1, the hexagonal configuration basic to Holland's theory is present for both males and females. (Hanson, et al, 1977, provide further data on this point.)

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Insert Figure 1 about here.

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Both the hexagonal configuration of factor loadings and the correlations between parallel UNIACT and ACT-IV scales suggest that the sex-balanced scales have good construct validity as measures of Holland types.

Comparisons of Validity Data

As previously noted, sex-balanced vocational interest scales provide an alternative to traditional sex-restrictive scales. However, some have claimed that they must be "less valid." Research summarized in a previous section showed that sex-balanced reporting procedures based on traditional scales were at least as valid and sometimes more valid than sex-restrictive reporting procedures. Hence, sex-balanced reporting procedures provide the strongest challenge to sex-balanced scales.

Table 5 summarizes the results of studies comparing the validity of sex-balanced

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Insert Table 5 about here.

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score reports and sex-balanced scales. As before, an index to abstracts is provided for studies that have already appeared in the professional literature.

Studies 2 and 3 listed in Table 5 are the same as those described previously. Hit rates for the two studies are summarized in Table 6. The unweighted

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Insert Table 6 about here.

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average hit rates in Table 6 indicate that results for sex-balanced scales are similar to those for sex-balanced reports. (As before, hit rates that differ by less than 5% were considered to be similar.) However, trends favor the sex-balanced reports in three of the four comparisons.

The data from Studies 2 and 3, together with the previous data summarized in Table 5, suggest a similar level of validity for unisex scales and sex-balanced score reports. As Hanson and I have noted in a recent article (Prediger and Hanson, 1978), "perfect sex balance has not been achieved with [UNIACT scales]. Indeed, there is no evidence that the vocational interests of males and females are exactly alike." But we believe that, taken as a whole, the validity data suggest "that similar interest patterns for males and females come closer to reality than the highly divergent interest patterns produced by many interest inventories." In summary, sex-balanced scales appear to provide a promising alternative for assessing basic interests, Holland types in particular.

The field of vocational interest assessment has had 50 years of practice in constructing inventories on which males and females score differently. Given that perspective, we feel pretty good about what has been accomplished over the past four years. Fifty years of tradition in interest assessment are not easy to overcome, however, as noted in the section that follows.

Some Propositions in Search of Test Users

In order to provide perspective on why sex-restrictive interest assessment will be with us for a long time, I have assembled a list of nine propositions that have been made in the professional literature--though in a more seductive manner. The propositions are uncontaminated by the results of research. Nevertheless, I believe they deserve your serious (but not too serious) attention.

1. Once sex-role socialization has taken hold, a counselee's vocational options are restricted for life. Corollary: Because interest inventories simply tally the effects of socialization, the only valid way to eliminate sex-restrictive scores is to revise society. Revising society is easier than revising interest inventories. But, for all of your counselees, it's already too late.

2. The items used on vocational interest inventories (e.g., would you like to operate a power shovel, repair a hot rod, drill soldiers, tend babies) are "gender neutral." Hence, any differences in the interest scores of males and females simply reflect a FACT OF LIFE. Corollary: Interest inventories on which males and females receive similar scores are not just invalid, they mess with Mother Nature.

3. If one develops an interest inventory on which males and females receive similar scores, one must do the same for Bohemians, Unitarians, Middle Americans, and card-carrying Democrats--regardless of whether bias exists for any of these groups. The result will be an inventory with no more than two or three items. It will make everyone appear equal.

4. Raw scores are accurate indicators of basic human characteristics and, thus, they can be used by psychologists "like a physicist uses a ruler."

5. The correct way to validate an interest inventory is to see how well it predicts which occupations counselees will eventually enter or prefer. Counselors make heavy use of such predictions and counselees find them simply amazing.

6. Interest inventories should suggest occupations that parallel the traditional employment distributions and stated preferences of males and females. Corollary: An interest inventory that suggests nontraditional occupations to a counselee not only messes with Mother Nature, it prevents quick closure of the case.

7. If the "effects" of an interest inventory on males and females are "similar" (e.g., if both males and females explore the occupations suggested by their scores), then it is SEX FAIR--even if the suggested occupations are

highly sex sterectypic. Corollary: Counselors who produce "similar effects" on male and female counselees are also SEX FAIR. However, claims regarding male chauvinist counselors are ambiguous.

8. There are numerous purposes for using interest inventories in vocational counseling, for example--to enhance self-knowledge and identify career alternatives; to enhance self-knowledge and identify career alternatives for exploration; to (etc.) and compare career alternatives with current expressed choices; to (etc.) for college sophomores, disco dancers, clone doners, and near-sighted left fielders. The number of purposes is SO GREAT that issues of sex bias can never be resolved by empirical research or scientific reason.

9. There are numerous definitions of sex bias in interest inventories. Until everyone agrees on a single definition, sex bias can't even be identified much less eliminated. Corollary: Efforts to eliminate racism will also be useless until everyone agrees on a single definition.

For all of the above reasons, sex-restrictive interest inventories will be with us for a long time. Yet, millions of vocational interest inventories are used, year in year out, by counseling psychologists and others in the helping professions. Research has shown that both sex-restrictive and sex-balanced interest reports produce more exploration of the vocational options that are suggested (Prediger, McLure, & Noeth, 1976). Each year, many persons make vocational plans based, at least in part, on sex-restrictive interest reports. It is difficult to imagine a clearer example of a problem that needs to be and can be addressed.

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Table 2

Summary of Validity Data for Sex-restrictive and Sex-balanced Score Reports of Holland Types

Index to abstracts[a]	Type of validity	Time interval	Sample; No. of males (M) & females (F)	Criterion; No. of criterion groups	Relative performance of sex-balanced reports (SBR) & sex-restrictive reports (SRR)
A5	Construct	Concurrent & longitudinal (5 years)	Young adults & adults in 3 samples; M=20,000, F=19,000	Occ. status (2 samples) & preference; M=104, F=104	SBR more in agreement with congruency principle and occupational typology in Holland's theory of careers
A7	Construct	Concurrent	High school & college students & adults in 7 samples; M=18,000, F=20,000	NA	SBR more in agreement with consistency principle in Holland's theory of careers
A11	Criterion-related	Concurrent	College seniors; M=5500, F=5000	College major; M=5 & F=5 (by Holland type)	SBR and SRR hit rate similar[b] for males, SBR better for females
A12	Criterion-related	Longitudinal (5 years)	Young adults; M=648, F=425	Occ. status; M=6 & F=5 (by Holland type)	SBR hit rates better for males and females
A12	Criterion-related	Longitudinal (2 years)	College sophomores; M=549, F=894	College major; M=5 & F=5 (by Holland type)	SBR and SRR hit rates similar for males; SBR better for females
B4	Criterion-related	Longitudinal (1-3 years)	College students; F=989	Occ. preference; F=5 (by Holland type)	SBR and SRR hit rates similar for females; SBR data not available for males

Continued on next page.

Table 1

Overlap of Scores for Males and Females on Various Interest Scales Assessing Holland Types

Scale	Scales based on traditional items						Brand X[g]
	SDS[a]	VPI[b]	SCII[c]	CAI[d]	CDM[e]	ACT-IV[f]	
Investigative	77%	85%	88%	90%	91%	84%	93%
Artistic	78	77	75	77	77	76	87
Social	50	62	90	82	56	60	85
Enterprising	87	90	85	97	86	98	99
Conventional	75	94	99	74	98	95	97
Realistic	32	62	65	63	54	57	89

Note. Percent overlap is based on Dunnette's (1966) table for Tilton's (1937) measure of overlap.

[a]Data are based on Self-Directed Search (SDS) summary scores for 2,152 male and 2,431 female high school students (Gottfredson & Holland, 1975a).

[b]Data are based on Vocational Preference Inventory (VPI) raw scores for 6290 male and 6143 female entering college students (Holland, 1975, p. 29).

[c]Data are based on Strong-Campbell Interest Inventory (SCII) Theme Scales standard scores for 300 males and 300 females in the men- and women-in-general samples (Campbell, 1977, p. 33).

[d]Data are based on Career Assessment Inventory (CAI) Theme Scale standard scores for a "composite reference sample" of 750 males and 750 females (Johansson, 1976, p. 23). This sample was used to select a subset of CAI items that minimized theme scale sex differences (Johansson, 1976, p. 20).

[e]Data are based on Harrington/O'Shea System for Career Decision Making (CDM) raw scores for 435 male and 380 female high school and college students (Harrington & O'Shea, 1976, p. 9).

[f]Data are based on ACT Interest Inventory (ACT-IV) raw scores for the 1,232 males and 1,738 females in the ACT-IV national norm group for college-bound persons (Hanson, 1974, pg. 14). These data are for purposes of comparison only. Standard scores based on same-sex norms are used in ACT-IV score reports (Hanson, 1974).

[g]Data for 1,247 males and 1,693 females are for a new unisex interest inventory based on sex-balanced items. Brand X data are provided for perspective only.

Table 3

Criterion Group Hit Rates for Sex-restrictive and Sex-balanced Score Reports of Holland Types

Criterion group by Holland type	Sample size		Hit rates (in %)			
			Sex-restrictive reports[a]		Sex-balanced reports[b]	
	M	F	M	F	M	F
Study 1						
Investigative	2008	999	66	42	51	54
Artistic	778	1353	28	36	47	42
Social	621	2343	46	76	26	22
Enterprising	1147	414	25	11	32	29
Conventional	457	297	28	32	48	41
Realistic	835	143	31	2	38	27
Unweighted average hit rate			37	33	40	36
Study 2						
Investigative	323	348	59	49	46	50
Artistic	148	188	62	60	79	57
Social	151	182	41	56	30	24
Enterprising	121	121	57	36	62	43
Conventional	105	118	31	51	47	55
Realistic	81	76	37	9	33	47
Unweighted average hit rate			48	44	50	46
Study 3						
Investigative	187	181	50	28	40	32
Artistic	142	187	40	46	55	41
Social	76	132	54	62	41	26
Enterprising	124	145	44	22	37	34
Conventional	101	132	50	42	69	62
Realistic	107	75	42	9	36	35
Unweighted average hit rate			47	35	46	38

Note. All studies involved traditional interest items assessing Holland's (1973) six types. The same interest inventory was used in each comparison of reporting procedures.

[a] Reports are based on raw scores.

[b] Reports are based on standard scores derived from same-sex norms.

Table 2 Continued

Index to abstracts[a]	Type of validity	Time interval	Sample; No. of males (M) & females (F)	Criterion; No. of criterion groups	Relative performance of sex-balanced reports (SBR) & sex-restrictive reports (SRR)
1[c]	Criterion-related	Longitudinal (4 years)	College seniors; M=5846 & F=5549	College major; M=6 & F=6 (by Holland type)	SBR and SRR hit rates similar for males and for females; differences favored SBR
2[c]	Criterion-related	Concurrent	College seniors; M=929 & F=1033	College major; M=6 & F=6 (by Holland type)	SBR and SRR hit rates similar for males and for females; differences favored SBR
3[c]	Criterion-related	Concurrent	College-bound students; M=737 & F=852	Occ. preference; M=6 & F=6 (by Holland type)	SBR and SRR hit rates similar for males and for females
4[c]	Criterion-related	Concurrent	Adults; M=247 & F=293	Occ. status; M=12 & F=12 (by Holland type)	SBR and SRR match between criterion group status and highest interest scale mean for criterion group members were similar for males and for females

Note. Sex-balanced reports (SBR) based on same-sex norms are compared with sex-restrictive reports (SRR) based on raw scores for the same interest inventory. All studies involved traditional interest items assessing Holland's six types.

[a]Index refers to abstracts in attached paper entitled "The ACT Vocational Interest Research Program: Summary of Reports (7/78)."

[b]When SBR and SRR criterion group hit rates differed by less than 5% (e.g., 46% vs. 42%), they were considered to be similar.

[c]Abstract not available. See descriptions of Studies 1, 2, 3, and 4 in this paper.

Table 5

Summary of Validity Data for Sex-balanced Score Reports and Sex-balanced (Unisex) Scales

Index to abstracts[a]	Type of validity	Time interval	Sample; No. of males (M) & females (F)	Criterion; No. of criterion groups	Relative performance of sex-balanced reports (SBR) & sex-balanced scales (SBS)
A4	Construct	Concurrent	College-bound students; M=729 & F=1173	NA	SBR and SBS demonstrate similar construct validity as measures of Holland types
A8	Criterion-related	Concurrent	College-bound students; M=582 & F=878	Occ. preference; M=6 & F=5 (by Holland type)	SBR and SBS discriminate among criterion groups in similar manner; hit rates similar[b] for males and for females
A10 & A13	Construct	Concurrent	High school juniors; M=914 & F=937	NA	SBR and SBS demonstrate similar construct validity as measures of Holland types
2[c]	Criterion-related	Concurrent	College seniors; M=929 & F=1033	College major; M=6 & F=6 (by Holland type)	SBR and SBS hit rates similar for males and for females
3[c]	Criterion-related	Concurrent	College-bound students; M=737 & F=852	Occ. preference; M=6 & F=6 (by Holland type)	SBR and SBS hit rates similar for males and for females; differences favored SBR

Note. Sex-balanced reports (SBR) based on the application of same-sex norms to traditional interest scales are compared with scores obtained from sex-balanced (i.e., unisex) scales. All comparisons involve two interest inventories, each designed to assess Holland's six types.

[a]Index refers to abstracts in attached paper entitled "The ACT Vocational Interest Research Program: Summary of Reports (7/78)."

[b]When SBR and SRR hit rates differed by less than 5% (e.g., 46% vs. 42%), they were considered to be similar.

[c]Abstract not available. See descriptions of Studies 2 and 3 in this paper.

Table 4

Male-Female Score Overlap for UNIACT Sca

Scales (Holland types in parentheses)	UNIACT national norm group					Percent overlap for other samples		
	Males		Females		Percent			
	$\bar{X}$	SD	$\bar{X}$	SD	overlap	1[a]	2[b]	3[c]
Science (I)	2.20	.58	2.10	.60	93	90	95	92
Creative Arts (A)	2.09	.51	2.26	.52	87	94	85	86
Social Service (S)	2.34	.42	2.48	.37	85	84	85	84
Business Contact (E)	2.16	.43	2.17	.44	99	96	98	100
Business Detail (C)	2.01	.49	2.05	.54	97	97	97	98
Technical (R)	1.89	.42	1.77	.44	89	82	91	87

Note. The national norm group consists of a systematic random sample of 1247 males and 1693 females drawn from the 198,000 persons registering for the November 1977 ACT Assessment Program (AAP) national test date. Percent overlap is based on Dunnette's (1966) table for Tilton's (1937) measure of overlap.

[a]Data based on cross sectional sample of 1,851 11th graders (914 males and 937 females) attending 16 high schools in 15 states (Hanson, et al., 1977).

[b]Data based on systematic random sample of 737 males and 852 females drawn from the 118,000 high school seniors registering for the October 1977 AAP national test date. Before sample selection, the population was stratified by Holland type on the basis of vocational plans.

[c]Data based on systematic random sample of 1297 males and 1788 females drawn from the 127,000 persons registering for the October 1977 AAP national test date. This sample provided UNIACT norms during the 1977-78 AAP test year.

Table 6

Criterion Group Hit Rates for Sex-balanced (Unisex) Scales and Sex-balanced Score Reports for Holland Types

Criterion group by Holland type	Sample size		Hit rates (in %)			
			Sex-balanced (unisex) scales[a]		Sex-balanced reports[b]	
	M	F	M	F	M	F
Study 2						
Investigative	323	348	53	55	46	50
Artistic	148	188	63	61	79	57
Social	151	182	27	32	30	24
Enterprising	121	121	56	49	62	43
Conventional	105	118	42	61	47	55
Realistic	81	76	33	22	33	47
Unweighted average hit rate			46	46	50	46
Study 3						
Investigative	187	181	43	22	40	32
Artistic	142	187	45	48	55	41
Social	76	132	29	29	41	26
Enterprising	124	145	41	31	37	34
Conventional	101	132	64	51	69	62
Realistic	107	75	41	23	36	35
Unweighted average hit rate			44	34	46	38

Note. All comparisons involve two interest inventories, each designed to assess Holland's six types.

[a]Scales consist of items for which males and females give similar responses. Reports are based on standard scores derived from combined-sex norms.

[b]Reports are based on standard scores derived from same-sex norms.

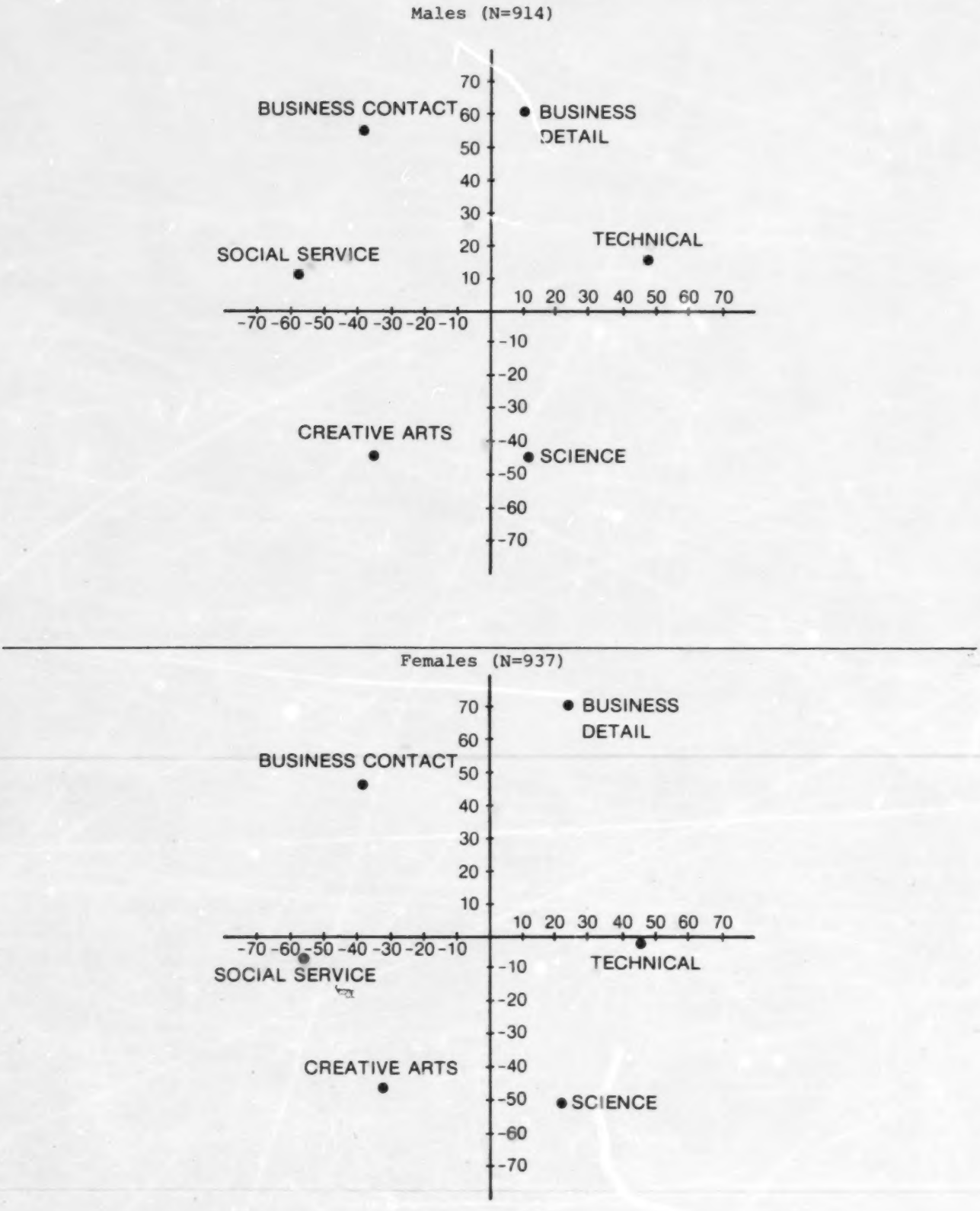

Figure 1. Plot of UNIACT theory-based factor loadings. (Source: Hanson, et al., 1977, p 21)